IN THE CLAIMS

1. (Currently Amended) A method of manufacturing a rigid foam board consisting essentially of:

incorporating nano-particles into a polymer melt, said nano-particles being selected from calcium carbonate, intercalated graphites and expanded graphites and having a particle size in at least one dimension less than 100 angstroms;

incorporating a blowing agent into the polymer melt under a first pressure and at a first temperature;

extruding the polymer melt under a second pressure and at a second temperature, the second pressure and second temperature being sufficient to allow the polymer melt to expand and form a foam board having a solid foam structure; and

cooling the foam board, said foam board having an average cell size between 60 μm and 120 μm and having a cell size distribution;

wherein said polymer melt includes an alkenyl aromatic polymer material.

2. (Previously Presented) A method of manufacturing a rigid foam board according to claim 1:

wherein the polymer includes at least one alkenyl aromatic polymer selected from alkenyl aromatic homopolymers, copolymers of alkenyl aromatic compounds and copolymerizable ethylenically unsaturated comonomers.

3. (Previously Presented) A method of manufacturing a rigid foam board according to claim 2:

wherein the polymer includes a major portion of at least one alkenyl aromatic polymer selected from the group consisting of the polymerization products of styrene, α-methylstyrene, chlorostyrene, bromostyrene, ethylstyrene, vinyl benzene and vinyl toluene; and

a minor portion of a non-alkenyl aromatic polymer.

4. (Previously Presented) A method of manufacturing a rigid foam board according to claim 3:

wherein the polymer includes at least 80 wt% polystyrene.

5. (Previously Presented) A method of manufacturing a rigid foam board according to claim 2:

wherein the blowing agent includes at least one composition selected from aliphatic hydrocarbons having 1-9 carbon atoms, halogenated aliphatic hydrocarbons having 1-4 carbon atoms, carbon dioxide, nitrogen, water, azodicarbonamide and p-toluenesulfonyl.

6. (Previously Presented) A method of manufacturing a rigid foam board according to claim 5:

wherein the blowing agent includes at least one composition selected from methane, methanol, ethane, ethanol, propane, propanol, n-butane, isopentane, carbon dioxide, nitrogen, water, azodicarbonamide, p-toluenesulfonyl, HCFC-142b and HCFC-134a.

7. (Previously Presented) A method of manufacturing a rigid foam board according to claim 2, further comprising:

incorporating an additive into the polymer melt before forming the foam.

8. (Previously Presented) A method of manufacturing a rigid foam board according to claim 7:

wherein the additive includes at least one composition selected from flame retardants, mold release agents, pigments and fillers.

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10. (Previously Presented) A method of manufacturing a rigid foam board according to claim 2:

wherein the nano-particles are incorporated into the polymer melt at a rate between 0.01 and 10 weight percent, based on polymer weight.

11. (Previously Presented) A method of manufacturing a rigid foam board according to claim 2:

wherein the nano-particles are incorporated into the polymer melt at a rate between 0.5 and 5 weight percent, based on polymer weight.

12. (Previously Presented) A method of manufacturing a rigid foam board according to claim 11:

wherein the polymer includes a major portion of polystyrene, polyethylene or polymethyl methacrylate.

13. (Previously Presented) A method of manufacturing a rigid foam board according to claim 10:

wherein the nano-particles are formed by a technique selected from intercalation with polystyrene and exfoliation of expandable graphite particles in a polystyrene or polymethyl methacrylate matrix.

14. (Previously Presented) A method of manufacturing a rigid foam board according to claim 2, wherein:

the average cell wall thickness is less than about 10 μm;

the average strut diameter is less than about 20 μm;

the cell orientation is between about 0.5 and 2.0; and

the foam density is less than about 100 kg/m^3.

15. (Previously Presented) A method of manufacturing a rigid foam board according to claim 14, wherein:

the average cell wall thickness is between about 0.2 and about 1.0 μm;

the average strut diameter is between about 4 and about 8 μm;

the cell orientation is between about 1.0 and about 1.5; and

the foam density is between about 20 and about 50 kg/m^3.

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